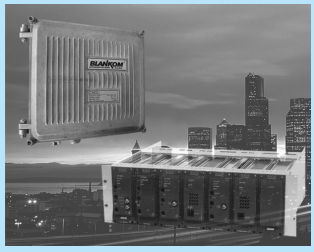
BLANKOM®

Professional Headend Solutions

USER MANUAL

MPEG-ENCODER VEA 107



USER MANUAL

...Selling Signals

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1. Basic installing and operating instructions

1.1 Safety instructions

- When assembling and commissioning the VEA MPEG2 Encoders and executing the settings, always follow the accompanying instructions exactly.

- The devices are not to be assembled and brought into use by anybody who is not an authorised technician.

- When components are being installed into headends, ensure that EMC regulations are observed.

- All assembly, installation and cable connection must take place with cold state of the device.

- The provisions of DIN EN 50083 must be observed at all times when working with the equipment. In particular, DIN EN 50083/1 regarding safety may on no account be ignored.

- The devices come under protection classification I. It is absolutely necessary, therefore, to insert the mains plug into a socket with protective contact.

Note:
Connecting external video sources of which the mass has a different potential from that of the VEA107 or VEA108 may cause “hum” (avoided by matching the potentials or isolating them from each other).

1.2 Contact

If there are any questions or problems, help is available from

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1.3 General description of functions

The MPEG2 Encoders VEA 107/108 are components of the A-LINE headend system.
Depending on the device and version (see Section 4.2), they serve to encode up to 3 analogue or uncompressed digital audio and/or visual signals, integrating them into the DVB Transport Stream.
Analogue video and audio signals are fed into the system via the respective analogue input ports (video and audio); for “audio-embedded” digital A/V signals, the devices can be equipped with serial digital interfaces (SDIs).
The output signal is a DVB Transport Stream as per ISO13818-1 and is transmitted from an ASI interface. ASI stands for Asynchronous Serial Interface. This signal can be fed into the cable TV network with the aid of a QAM modulator.
The devices, being MPEG2 encoders with a five-fold “cascade” facility, are effectively Transport Stream Multiplexers, producing “bouquets” of up to 15 programmes. These, again, are broadcast via the ASI and can be further processed in the same way as described above.
There are suitable QAM modulators available, for instance in BLANKOM’s A-LINE headend system. To choose the required type and to find out how to deal with these additional components, please refer to the product catalogue and the relevant description.

Notes:
The ASI input ports may only be used for Transport Streams from the VEA 107 or VEA 108 encoders. It is not possible to incorporate ASI signals from other systems into the Transport Stream.

The output signal contains all the tables necessary to the programme and associated services (PAT, PMT and SDT). An NIT will be generated but will not contain any network-specific information. A succeeding QAM modulator is responsible for the necessary adaptation of the NIT.

There are options permitting RDS data transfer via additional channel-specific access ports and enabling additional customer-specific details to be included via the Ethernet interface (see Section 3.5).

1.4 “EASY Multiplexing”

“EASY Multiplexing” is a simple, uncomplicated means of producing a digital ASI Transport Stream. Depending on which device is in use, up to 3 analogue (A/V) signals or up to 3 digital (SDI) signals can be combined simply by one VEA 107 or VEA 108 into a single standard DVB signal, by means of “Plug and Play”. The parameters necessary have been set in the device at the factory
(see Section 3.2).

See Section 3.3.4.2 for details of how VEA 107 or VEA 108 cascade systems using multiple devices are brought into use and how the Transport Stream can be manipulated from the HTML user interface.

2. Explanation of the functional elements

2.1 Front view

Fig. 1: Front view, VEA 107 or VEA 108

LED display

POWER	Operating voltage displayed
INPUT VIDEO A, B, C	LED illuminated: video signal recognised
LED not illuminated:	no video signal or video signal does not match standard
INPUT TS (Master Mode)	LED not illuminated
INPUT TS (Slave Mode)	LED illuminated: ASI-TS signal at input port LED flashing: no ASI-TS signal at input port

2.2 Rear view

Fig. 2: Rear view of VEA 107 or VEA 108 (with RDS option)

Input and output ports

VIDEO IN (A, B, C)	Video input ports
AUDIO IN (A, B, C)	Audio input ports
ASI IN	Input port for Transport Stream (activated only if device working as Slave)
ASI OUT	Transport Stream output port
NET	Ethernet interface (network connection point for updating firmware, device control)
RS232	RS232 interface (firmware update, factory settings)
RDS IN (A, B, C)	Input ports for RDS signals of channels A, B and C (optional)

Sunk key

FACTORY SET	Resets all settings to factory settings

2.3 Audio input socket allocation (8 poles, DIN 45326)

1 Stereo left+ or dual A+ or mono+
2 Shielding (mass)
3 Stereo right+ or dual B+
4 Stereo left- or dual A- or mono-
5 Stereo right- or dual B-
6 not used
7 not used
8 not used

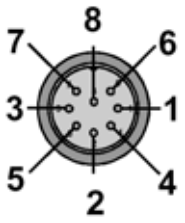


Fig. 3: Pole allocation, audio socket

3. Operating instructions

3.1 Assembly and commissioning

NB All assembly and connection must take place when no electricity has been connected.
On no account may the safety notes (see Section 1.1) be ignored.

The device is intended to be installed on sliding rails in a 19-inch rack.
It is secured from the front with the assembly set supplied.

One height unit must be allowed between devices for the avoidance of overheating. This may be disguised with a louvered ventilation plate if desired.

Contact must be made for the video, audio and ASI signals at the A, B and C connection points on the rear of the device using appropriate cables. Those listed in Section 4.4.2 are recommended.

From the ASI output port, the signal is sent either straight to the QAM modulator or to the succeeding Slave.

As soon as all the wiring has been done for the signal, the mains cable can be connected and the device switched on.

The operating status is shown by the LEDs on the front panel (see Section 2.1).

3.2 Operation using factory settings (no further configuration)

The VEA 107 or VEA 108 is delivered with optimal configuration as Master for 3 AV channels. It will be functional with these settings without any further configuration. It is possible to get back the factory settings at any time by using the sunk “Factory Setting” key (see Section 3.4.5).

All information on programmes and Transport Stream is neutral but can be adapted as necessary to match the requirements of a cable network operator. To do this, it is necessary to call up the HTML user interface via the Ethernet interface (see Section 3.3).

The factory settings for the VEA 107 are summarised in the table which follows.

Parameters	Value	Notes
TS- ID (PAT, SDT, NIT)	*****	5-digit serial number
Master / Slave	Master	
Provider name	Provider	
Programme name	Prog - A	
	Prog - B	
	Prog - C	
Create NIT: (Master only)	Dummy	
Programme language	deu	
Mbps TS out bitrate	36	Total bitrate for TS (ASI-OUT)
Used input channels (number of AV channels)	3 (+ Data)	To permit additional data (teletext etc.) to be transmitted, a data channel is always allocated in the Master. All programmes and the data channel have an equal share in the overall bitrate. The maximum system bitrate per channel is thus 36 / (n+1)
Video system	PAL	A choice can be made between PAL and NTSC for each channel.
System bitrate	8 Mbps	3 x A/V channels and 1 x data channel
Audio bitrate	192 kbps	
Audio mode	Stereo	
TTX processing	Video IN	The teletext information, contained in the video signals for lines 7 to 15 and 19 to 22, also 320 to 328 and 332 to 335, will be digitized and then included in the DVB Transport Stream.
VPS-WSS	VPS	VPS transmission and WSS active

Table 1: factory settings

3.3 Configuration via the Ethernet interface

If it is necessary to change the default configuration or to create a cascade of more than one VEA 107 or VEA 108 to create a shared data stream (see Section 3.3.4.2), the HTML user interface must be called up on a computer connected to the device(s).
How the user interface works is almost self-explanatory. Any special features of use will be explained in the following chapters.

3.3.1 Connecting the network to the computer

System requirements:
- PC or laptop with 10/100 Mbit Ethernet interface
- Internet browser (such as Windows Internet Explorer)

Making the connections:
The VEA 107 or VEA 108 must be connected to the PC network using an Ethernet cable.
If connected directly to a PC, the Ethernet cable must be a cross-linked cable. The IP address of the VEA 107 or VEA 108 on delivery is 192.168.2.86.
The address of the network connection in the PC must be adapted to accommodate the IP address of the VEA 107/108 (subnet mask: 255.255.255.0 / IP address: 192.168.1.XXX).

Do not let XXX be exactly the same as the IP address of the VEA 107 or VEA 108.
When systems which are made up of more than one device as a cascade system are initially configured, it is necessary to ensure that VEA 107 or VEA 108 transcoders are connected to the network one after the other and configured separately, as the IP addresses of such transcoders on delivery are all the same.

The IP address of the VEA 107 or VEA 108 is entered on the browser screen. When the link up has been successfully made, the device produces a pop-up log-in window:

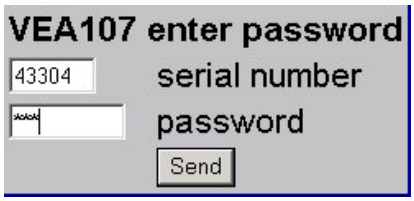


Fig. 4: Log-in window

Access to the configuration menu is password protected.
When the device is supplied, the password is "**neu**" (the German word for "new").

It is also necessary to enter the 5-figure serial number of the device being connected to the computer. This number is on the rear of the device. There are more labels showing the serial number contained in the scope of delivery; if desired, they can be placed somewhere else for easier identification, for instance on the front of the device.

Note:
If password or IP address are unknown or have been forgotten, the factory settings can be re-established by pushing in the (recessed) "Factory Set" key (see also Section 3.4.5, Factory settings).
Afterwards the device is back in its state as delivered, with the access data and factory settings described above.
The configuration menu appears once log-in has been accomplished.
It is divided into three:

- Service and setup

- Default configuration

- Detailed configuration

The following sections describe the functions under each heading.

3.3.2 Service and setup

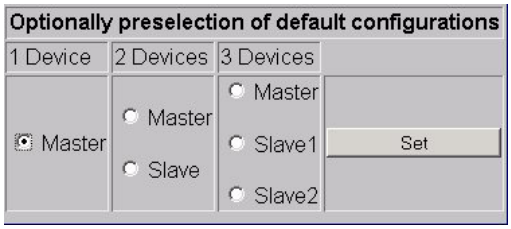
This area is configured by clicking soft-keys as appropriate to select the desired function (see Figure 5).
The following actions are possible:

- Password change	Changing the password for the device
- Factory setting	Resets all settings to factory settings
- Hilfe / Help	Calls up the help pages in German or English
- Download MIB	Downloads the MIB file specific to the device (ME.mib) to serve the system via SNMP
- Set Date & Time	Sets the clock within the device

Fig. 5: Setup and service menu

3.3.3 Default configuration

The preselection window shown in Figure 6 makes it simple to adopt automatic pre-settings of the best possible parameters for starting up a single, double or triple device system.



1 Device Single device system with 3 programmes

2 Devices Double device system with 6 programmes

3 Devices Triple device system with 9 programmes

Fig. 6: Menu for default configuration (factory settings)

This is where the mode of operation in the cascade of each individual VEA 107 or VEA 108 is entered (as Master, Slave, Slave1 or Slave2). (In special cases, it is possible to cascade a maximum of 5 devices, see Section 3.3.4.2.3.) The total Transport Stream is thereby shared across the individual programmes and the data channel.

At the same time, automatic programme names of a neutral nature are allocated, as are audio/video PIDs and service IDs in ascending order (see Tables 2 and 3).

Configuration	Input	Programme Name	Service	PMT	Video	Audio	TTX	RDS (piped mode)
Master	A	Prog - A	0x11 + offset	0x111	0x211	0x311	0x411	0x319
	B	Prog - B	0x12 + offset	0x112	0x212	0x312	0x412	0x31A
	C	Prog - C	0x13 + offset	0x113	0x213	0x313	0x413	0x31B
Slave1	D	Prog-D	0x21 + offset	0x121	0x221	0x321	0x421	0x321
	E	Prog-E	0x22+ offset	0x122	0x222	0x322	0x422	0x32A
	F	Prog-F	0x23 + offset	0x123	0x223	0x323	0x423	0x32B
Slave2	G	Prog-G	0x31 + offset	0x131	0x231	0x331	0x431	0x331
	H	Prog-H	0x32 + offset	0x132	0x232	0x332	0x432	0x33A
	I	Prog-I	0x33 + offset	0x133	0x233	0x333	0x433	0x33B
Slave3	J	Prog-J	0x41 + offset	0x141	0x241	0x341	0x441	0x341
	K	Prog-K	0x42 + offset	0x142	0x242	0x342	0x442	0x34A
	L	Prog-L	0x43+ offset	0x143	0x243	0x343	0x443	0x34B
Slave4	M	Prog-M	0x51 + offset	0x151	0x251	0x351	0x451	0x351
	N	Prog-N	0x52+ offset	0x152	0x252	0x352	0x452	0x35A
	O	Prog-O	0x53 + offset	0x153	0x253	0x353	0x453	0x35B

Table 2: Automatically allocated service IDs and PIDs

To get unique service IDs if there are several cascades in one headend, an offset is automatically added for the parameter “cascade number within network” (CNr):

Cascade no.	1	2	3	4	5	6	7	8
Offset	0	0x04	0x08	0x0C	0x80	0x84	0x88	0x8C

Table 3: Offset addition for the respective cascade numbers

3.3.4 Detailed configuration

The detailed configuration enables DVB identification characters and parameters such as provider name, network ID, program name, transmission parameters etc to be individually set.
The user interface enabling detailed configuration is basically the same in all BLANKOM devices whatever the system.

Note:
Whenever individual settings are made, care should be taken to ensure that the figures entered into the configuration mask make sense technically and/or count as valid figures.

3.3.4.1 The single device system (one Master)

This is the configuration which is basically the factory settings on delivery.
It can also be selected in the “1 Device” window of the menu of the default configuration (see Fig. 6).

Possible detailed configuration options are:

IP address, IP subnet mask	(necessary if the device is being integrated into an existing network)
TS-ID	(the 5-figure serial number is entered as default)
Provider name	(the default entry is “Provider”)
Network ID	(the default entry is “100”)
Programme names	(entered at first as “Prog-A”, “Prog-B” and “Prog-C”)

Figures 7-1 and 7-2 show all the possible setting options.

The default is 3 channels with standard figures for the system bitrate.

If these preset bitrates are being changed, account should be taken of the TS out bitrate which has been set and the number of channels to be transmitted, plus data channel and whether the new bitrates are compatible with these conditions (see Section 3.4.3).

Example: "Master" in a "1 Device" configuration

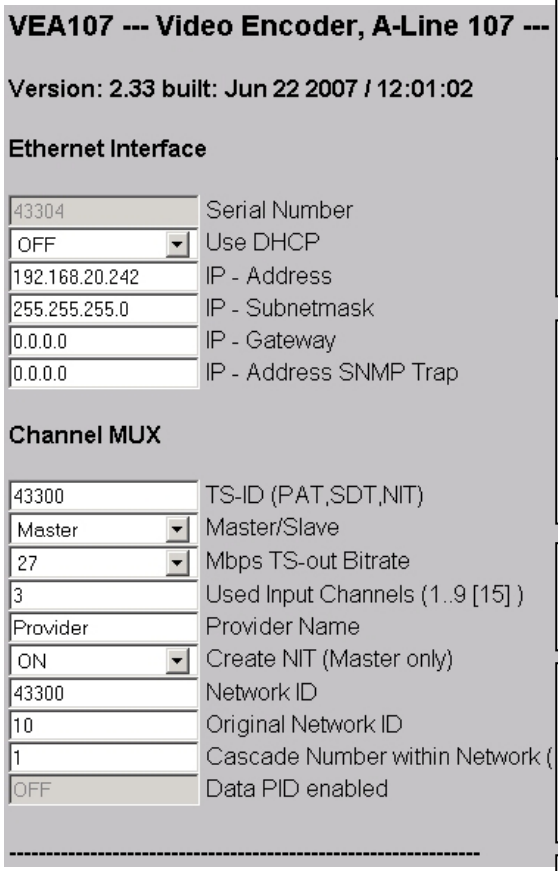

VEA107 --- Video Encoder, A-Line 107 ---
Version: 2.33 built: Jun 22 2007 / 12:01:02
Ethernet Interface
43304 Serial Number
OFF Use DHCP
192.168.20.242 IP - Address
255.255.255.0 IP - Subnetmask
0.0.0.0 IP - Gateway
0.0.0.0 IP - Address SNMP Trap
Channel MUX
43300 TS-ID (PAT,SDT,NIT)
Master Master/Slave
27 Mbps TS-out Bitrate
3 Used Input Channels (1..9 [15])
Provider Provider Name
ON Create NIT (Master only)
43300 Network ID
10 Original Network ID
1 Cascade Number within Network (
OFF Data PID enabled

Fig. 7-1: Menu, detailed configuration

IP-Address
The network address is set to 192.168.2.86 in state as delivered and when "Factory setting" is pressed. The IP address can be altered in this menu. If there is no DHCP service available, the pre-set address is used.

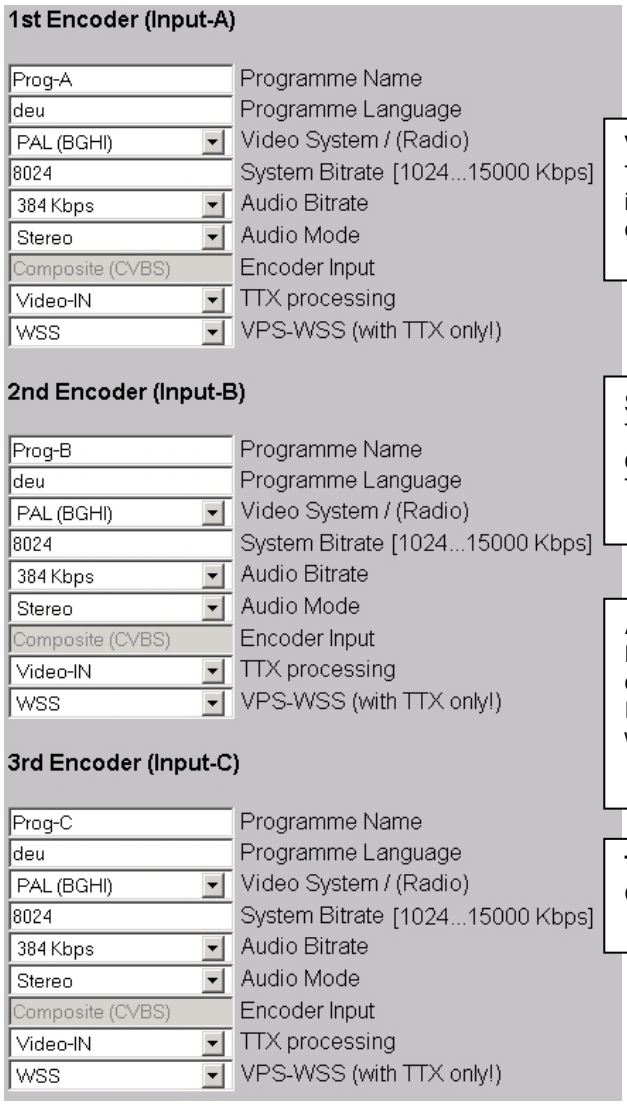
TS-ID (Transport Stream ID)
The Transport Stream identification is allocated individually. It may appear only once in the cable network. The 5-figure serial number is entered as default.

Create NIT
The Master device can create the framework for an NIT (Network Information Table) if required. The options are:
off - no NIT will be created, **dummy** – an empty NIT frame will be created, **Satellite** / **Cable** / **Terrestrial** – an NIT frame with the details appropriate to the TV format will be created.

Network ID
This must be exactly the same for all DVB channels within a cable network.

Cascade Number within Network
Each cascade of devices (max. 8) is given a separate address between 1 and 8 so that the PID is individualised (see Section 3.3.3)

Data PID enabled
This is a device option allowing customised data to be inserted into the TS (see Section 3.5.4).



Video System / (Radio)
This is for selecting the video standard (PAL, NTSC...) for the incoming signal. If the setting is “OFF”, only radio signals will be encoded (MPEG radio).

System Bitrate
The System bitrate is the bitrate (bandwidth) of a channel. It depends on the TS out bitrate and the number of channels within Transport Stream (see Section 3.4.3).

Audio Mode
For setting the sound mode: stereo, joint stereo, mono, dual channel, Use VPS.
If use VPS is set, the relevant broadcaster details in the VPS line will be adopted into the DVB signal.

TTX processing and VPS-WSS
Options (see Section 3.4.2).

Fig. 7-2: Menu, detailed configuration

3.3.4.2 Multi-device systems (cascades)

Because the VEA 107 or VEA 108 is a device which can be cascaded, multi-device systems can be created.
If this is done, changes need to be made to the set parameters from the HTML pages. Also, signal connections must be made (ASI-OUT/IN) between the devices using 75-ohm BNC cables (see Figure 8).

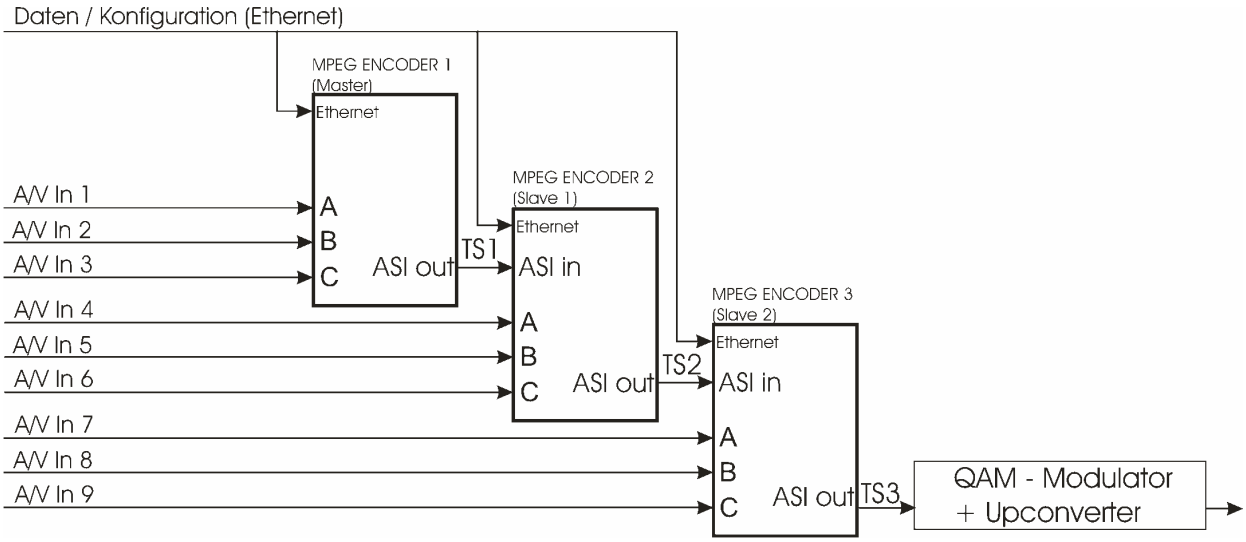


Fig. 8: Circuit diagram of a 3-device cascade

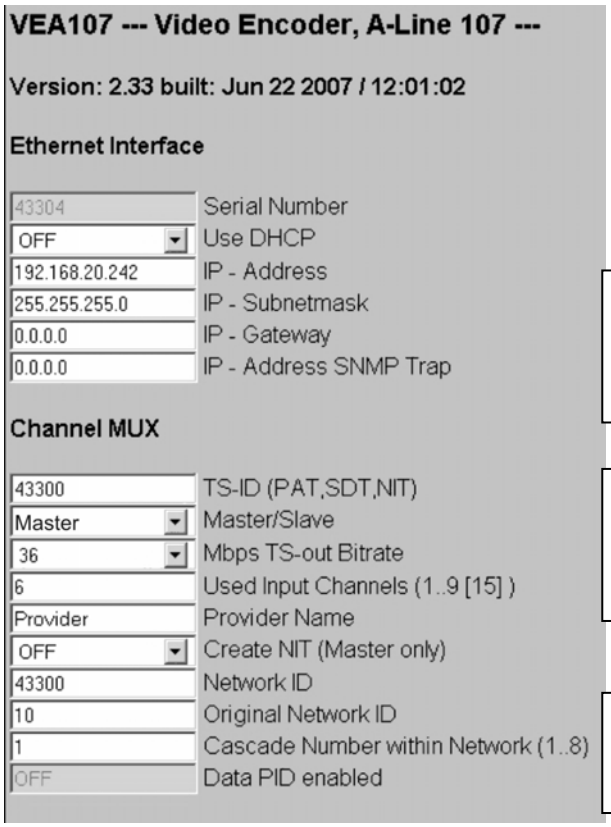
3.3.4.2.1 The double device system (one Master, one Slave)

From the double device system upwards, each device must be individually configured. Ethernet connections are established separately, starting with the Master (see Section 3.3.1).
For each device in the cascade, Master and Slave are designated under “2 Devices” in the menu of the default configuration by making the appropriate selection. Optimal bitrates for 6 programmes, also neutral programme names, are automatically assigned (see Section 3.3.3 and Fig. 6).
If a device is being configured as a Slave, the ASI data stream input port is activated in addition.
Once the default configuration has taken place for the 2-device system, there will be a system bitrate available to each channel of 4.92 Mbps. The detailed configuration is as in the single device system, with a few special features to note.

All devices in a cascade must be given the same TS ID so that they can create a shared Transport Stream.

The TS ID can be any number between 1 and 65535. However, at the start the TS ID will be the 5-digit serial number of the VEA 107 being initialised. In the simplest case, the TS ID of the Master should also be entered for the Slaves.

In cable networks with more than one DVB channel, each TS ID is allowed to appear only once, which means that the TS IDs of the Transport Stream(s) generated by the (single or cascaded) VEA 107/108 device(s) must all be different and must be different from those of the Transport Streams from other broadcasters. To avoid duplication it is therefore necessary for the TS IDs which are already allocated in the cable network to be known before further Transport Streams are added.


VEA107 --- Video Encoder, A-Line 107 ---
Version: 2.33 built: Jun 22 2007 / 12:01:02
Ethernet Interface
43304 Serial Number
OFF Use DHCP
192.168.20.242 IP - Address
255.255.255.0 IP - Subnetmask
0.0.0.0 IP - Gateway
0.0.0.0 IP - Address SNMP Trap
Channel MUX
43300 TS-ID (PAT,SDT,NIT)
Master Master/Slave
36 Mbps TS-out Bitrate
6 Used Input Channels (1..9 [15])
Provider Provider Name
OFF Create NIT (Master only)
43300 Network ID
10 Original Network ID
1 Cascade Number within Network (1..8)
OFF Data PID enabled

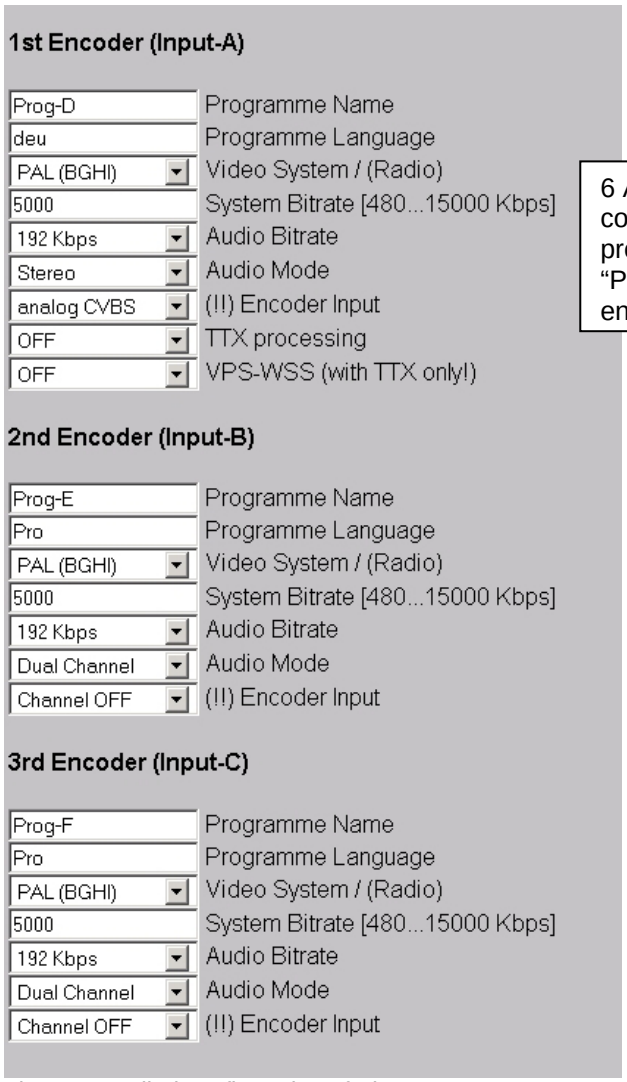
Example:
"Master" in a "2 Device" configuration

TS-ID (Transport Stream ID)
In 2- to 5-device systems the TS ID for all the devices (Master, Slave 1 and so on to Slave 4) must be exactly the same. But it may appear only once in the cable network.

Create NIT (Master only)
The decision as to generating NIT data must be made for the Master and will affect the whole cascade.

Network ID
The network ID must be exactly the same for all DVB channels within a cable network.

Fig. 9: Detailed configuration of Master ("Channel MUX" menu)



Example:
"Slave" in a "2 Device" configuration

6 AV programmes are integrated when the default configuration "Slave" is set here. The 3 programmes produced by the Slave will be given the programme names "Prog-D" to "Prog-F". Individual programme names can be entered here.

Fig. 10: Detailed configuration of Slave

3.3.4.2.2 The triple device system (one Master, two Slaves)

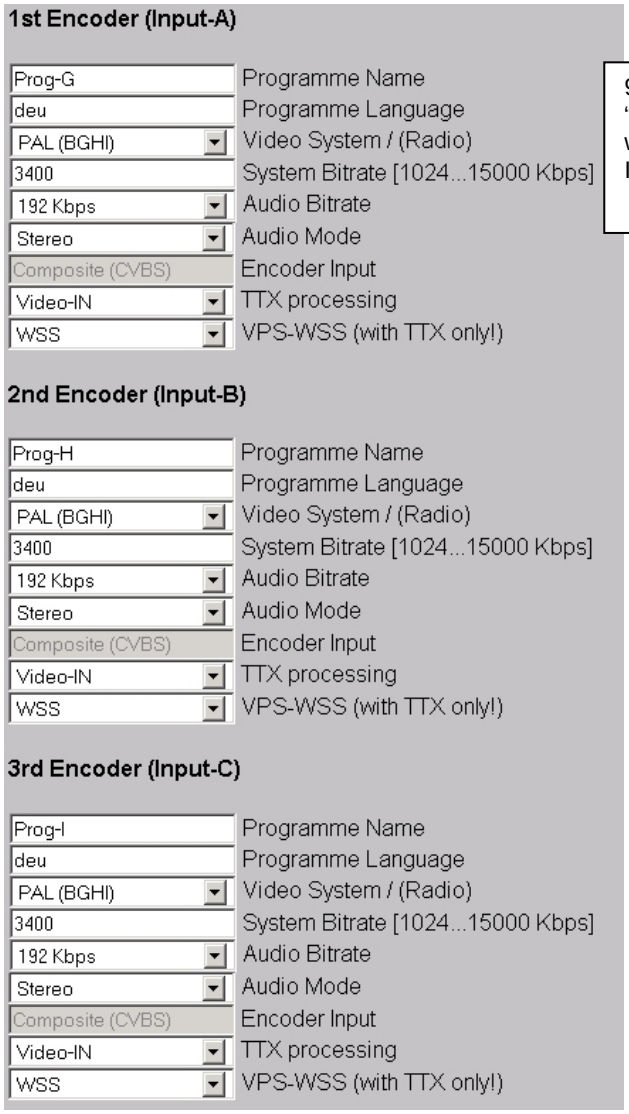
In the case of a triple device system, all three devices must be individually configured. The procedure is as for the configuration of the double device system (see Section 3.3.4.2.1). First, the Ethernet connections are, again, established separately, starting with the Master (see Section 3.3.1).
For each device in the cascade, Master and Slave are designated under "3 Devices" in the menu of the default configuration by making the appropriate selection. Optimal bitrates for 9 programmes, also neutral programme names, are automatically assigned (see Section 3.3.3 and Fig. 6).
If a device is being configured as a Slave, the ASI data stream input port is activated in addition.
Once the basic configuration has taken place for the 3-device system, there will be a system bitrate available to each channel of 3.52 Mbps.

All devices in a cascade must be given the same TS ID so that they can create a shared Transport Stream.

The TS ID can be any number between 1 and 65535. However, at the start the TS ID will be the 5-digit serial number of the VEA 107/108 being initialised. In the simplest case, the TS ID of the Master should also be entered for the Slaves.

Note:
In cable networks with more than one DVB channel, each TS ID is allowed to appear only once, which means that the TS IDs of the Transport Stream(s) generated by the (single or cascaded) VEA 107/108 device(s) must all be different and must be different from those of the Transport Streams from other broadcasters. To avoid duplication it is therefore necessary for the TS IDs which are already allocated in the cable network to be known before further Transport Streams are added.

Example: "Slave 2" in a "3 Device" configuration



9 AV programmes are integrated when the default configuration "Slave 2" is set here. The 3 programmes produced by the Slave 2 will be given the programme names "Prog-G" to "Prog-I". Individual programme names can be entered here.

Fig. 11: Detailed configuration of Slave 2

3.3.4.2.3 4- or 5-device systems (one Master, up to four Slaves)

For special situations, it is possible to combine up to 5 devices into a cascaded system. In principle, this type of configuration will enable a Transport Stream to be created carrying a maximum of 15 AV channels and a data channel. However, as the channels are equidistant from one another, there will only be 2.25 Mbps of bandwidth available per channel if the Transport Stream rate is 36 Mbps. If the maximum Transport Stream rate can be used (43.2 Mbps) a bandwidth of 2.7 Mbps could be achieved per channel. It must be said that the remaining bandwidth is only of limited suitability for the transmission of video signals, so that these types of configuration are not really recommended for that purpose.
However, one special situation would be the digitalisation of radio programmes. The relevant configuration is available without limit. For this task, too, as for the multi-device systems described above, all the devices involved must be optimised individually. Again, Ethernet connections are established separately, starting with the Master (see Section 3.3.1).

Below is an example of the settings for the individual devices.

Example:

Converting and combining 15 radio programmes into one DVB Transport Stream

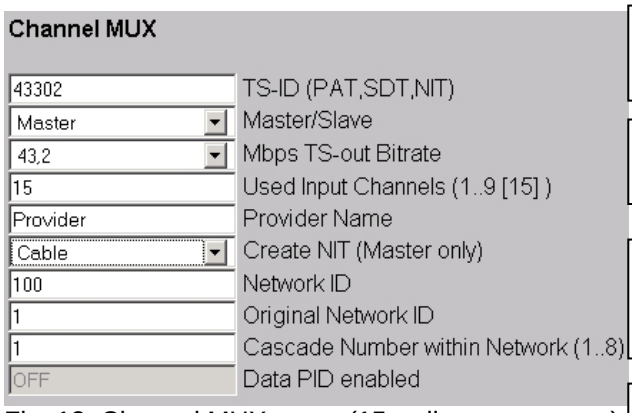


Fig. 12: Channel MUX menu (15 radio programmes)

TS-ID (Transport Stream ID)
The Transport Stream identification is allocated individually. It may appear only once in the cable network. All devices in a cascaded system must use the same TS ID.

Master / Slave
To be selected according to the position of the device.

(Mbps) TS out bitrate
16.6 Mbps – 43.2 Mbps [1)]

Used Input Channels (1…9[15])
Maximum number of channels: 15 (in a 5-device system)

Create NIT (Master only)
The decision as to generating NIT data can only be made for the Master.

Network ID
The network ID must be exactly the same for all DVB channels within a cable network.

[1)] This setting can be any between 16.6 Mbps and 43.2 Mbps. For 15 programme channels and one data channel it is necessary to have 16x1024 kbps = 16.38 Mbps (cf. Section 3.4.3). Bandwidth not required is filled with dummy traffic.
Further channel-specific settings must be made in the “1st, 2nd und 3rd Encoder” menus for the individual devices.

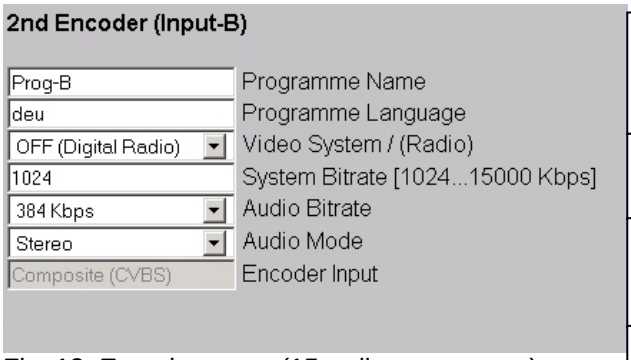


Fig. 13: Encoder menu (15 radio programme)

Programme Name
Individual programme names can be entered. The pre-settings are Prog-A …Prog-O.

Video System / (Radio)
"Off": Only audio data will be encoded.

System Bitrate [1024…15000 Kbps]
"1024" : this minimum data rate is adequate to audio transmission

Audio Bitrate
„384": For highest quality audio transmission, select the maximum value as there is plenty of bandwidth available for radio.

3.4 Extended configuration, individual settings

The configurations described above allow easy generation of DVB-compatible Transport Streams. In addition it is possible to set other special features (for example, data transfer).

3.4.1. Exclusive coding of audio signals

One special situation is the exclusive MPEG coding of audio signals.
For this task, too, as for the multi-device systems described above, all the devices involved must be optimised individually.
The Ethernet connections are established separately, starting with the Master (see Section 3.3.1). The "Video System / (Radio)" parameter in the encoder menu is set to "off". The system bitrate of the encoder channels can be set to the slowest value (1024 kbps). The TS out bitrate selected must be appropriate to the number of programme channels. For example, for 15 programme channels and one data channel, 16x1024 kbps = 16.38 Mbps will be required (cf. Section 3.4.3). For the exclusive audio coding, the option "RDS data transfer" (see Section 3.5.1) would be appropriate.

Note:
From software version 2.38 upwards, a system parameter "Audio Frames per PES Block (1…8)" has been added as an extra menu item.

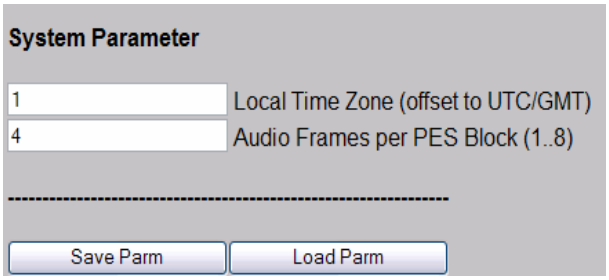


Fig. 14: "Audio Frames per PES Block (1...8)" system parameter
Although the standard allows 1 to 8 frames, this range is not supported from every connectable audio device with an ASI TS input port known to BLANKOM. which, with an inappropriate combination of frame value and audio bitrate, can lead to sound problems (for example, periodic breaks). With the additional menu item, it is now possible to adapt the BLANKOM device to accommodate the one connected. All "audio only" devices tested so far will work reliably with the setting "1" or "2"; devices for digital video and audio signals (ASI TS) require the setting "4".

3.4.2 TTX processing, VPS-WSS

These two menu items control how teletext information and the VPS and WSS control signals which are contained in the analogue signal will be captured, processed and adopted in the Transport Stream.
The following settings and functions are possible (Table 4):

Menu item	State	Function
TTX processing	OFF	No teletext or VPS and WSS data adopted
VPS-WSS	Any	
TTX processing	Video IN	The teletext data contained in lines 7 to 22 and 320 to 335 are digitalised and transmitted in the DVB Transport Stream
VPS-WSS	OFF	
TTX processing	Video IN	Teletext information from lines 7 to 15 and 19 to 22, also 320 to 328 and 332 to 335, will be digitized and then transmitted as part of the DVB Transport Stream. In addition, VPS and/or WSS (according to what has been selected) will be digitized and then transmitted as part of the DVB Transport Stream.
VPS-WSS	VPS WSS VPS+WSS	

Table 4: Configuration options for TTX and VPS-WSS

Note:
If the RDS option has been adopted for the device, the TTX processing and VPS-WSS functions are not available.

3.4.3 Transport Stream bitrate (TS out bitrate), system bitrate

When deciding the Transport Stream bitrate, various aspects must be considered. For high quality video transmission, the TS out bitrate should be as high as possible, while for transmission of small quantities of data much slower bitrates are quite adequate (for example, 16.38 Mbps are sufficient for digital radio with a maximum of 15 programmes, see also Section 3.3.4.2.3). Based on the TS out bitrate necessary in the relevant case, the next higher bitrate in the menu must be selected.

In the “Channel Mux” menu the following bitrates are available (see Tab. 5):

TS out bitrate (Mbps)	43.2	36.0	30.8	27.0	24.0	21.6	19.6	18.0	16.6	15.4	14.4	13.5

Table 5: TS out bitrates which can be set

Notes:
The same bitrate must be set for all devices within a cascade.

The maximum possible bitrate which can be set is 43.2 Mbps. If this bitrate is used, however, there must be a check made as to whether succeeding components such as modulators and up-converters can cope with Transport Streams at the bitrate.

The Transport Stream bitrate (TSBR) is subdivided into slots (channels) of the same size.
It should be observed that the first VEA 107 (Master) always provides a slot for teletext, data and tables as well as AV slots, so that the number of slots is always the number of AV channels (N) plus 1.

The more channels are being broadcast, the slower is the system bitrate (bandwidth) available for each channel (slot).
The maximum system bitrate (SBRmax) available in theory per encoder channel is therefore

SBRmax = TSBR / (N + 1)

In practice, approx. 10% of this value must be deducted as a safety buffer. The definitive formula is, therefore:

SBRmax = 0.9 x TSBR / (N + 1)

The following examples will clarify this:

Example 1:
1-device system, standard TS out bitrate = 36 Mbps, 2 AV channels with maximum system bitrate

Parameters	**Value**	**Notes**
TS out bitrate	36 Mbps	
Number of slots required	3	Total number of channels (slots) = 2 x AV + 1 x data = 3
Maximum adjustable system bitrate for channels A and B	10,800 kbps *)	0.9 x 36 Mbps / 3 slots = 10,800 kbps per slot

*) **Note:**
For the system bitrate a slower rate (depending on quality standards) may be selected: 7.5 Mbps, for example. The bandwidth not used is filled with dummy traffic.
A faster rate leads to an error and the relevant channel will not function.

Example 2:
1-device system, maximum TS out bitrate = 43.2 Mbps, 1 AV channel with maximum system bitrate

Parameters	**Value**	**Notes**
TS out bitrate	43.2 Mbps	
Number of slots required	2	Total number of channels (slots) = 1 x AV + 1 x data = 2
Maximum system bitrate that can be set for channel A	(19,440 kbps) 15,000 kbps *)	theoretically possible settings: 0.9 x 43.2 Mbps / 2 slots = 19,440 kbps per slot

*) Limit: the maximum system bitrate for the AV signal converter is 15,000 kbps.

Example 3:
5-device system, maximum TS out bitrate = 43.2 Mbps, 15 AV channels with maximum system bitrate

Parameters	**Value**	**Notes**
TS out bitrate	43.2 Mbps	
Number of slots required	15 x AV + 1x data	Total number of channels (slots) = 16
Maximum adjustable system bitrate for channels A to O	2,430 kbps	0.9 x 43.2 Mbps / 16 slots = 2,430 kbps per slot

Note:
If the number of channels required means that not all input ports of the VEA 107/108 are used and if it is the intention, as in example 1 and 2, to maximise the system bitrate of each encoder channel, the input ports not being used must be deactivated in the “Channel Mux” configuration menu. This is done by entering the number of channels used in the “used input channels” box.
So the input ports not used (in the examples given above these are input C in example 1, and B and C in example 2) will then be ignored during the signal generation process. It does not matter what values are set for them in the configuration menu; these can be ignored in the calculation of the maximum slot bitrate.
Here is a summary of channel allocations (see Table 6):

“used input chan-nels”	Active channels (default programme names)														
	Master			Slave 1			Slave 2			Slave 3			Slave 4		
	A (A)	B (B)	C (C)	A (D)	B (E)	C (F)	A (G)	B (H)	C (I)	A (J)	B (K)	C (L)	A (M)	B (N)	C (O)
1	v														
2	v	v													
3	v	v	v												
4	v	v	v	v											
5	v	v	v	v	v										
6	v	v	v	v	v	v									
7	v	v	v	v	v	v	v								
8	v	v	v	v	v	v	v	v							
9	v	v	v	v	v	v	v	v	v						
10	v	v	v	v	v	v	v	v	v	v					
11	v	v	v	v	v	v	v	v	v	v	v				
12	v	v	v	v	v	v	v	v	v	v	v	v			
13	v	v	v	v	v	v	v	v	v	v	v	v	v		
14	v	v	v	v	v	v	v	v	v	v	v	v	v	v	
15	v	v	v	v	v	v	v	v	v	v	v	v	v	v	v

Table 6: Allocation of “used input channels” and active input ports

3.4.4 Firmware updates

If a firmware update becomes necessary for the VEA 107/108, a Windows update programme will be provided by BLANKOM.
The update will be made either via the Ethernet interface or via the (RS232) control interface on the VEA 107 or VEA 108. For this purpose the computer and the VEA 107/108 must be connected to each other by means of either an Ethernet cable or a null modem cable (cross-linked cables in each case). After program has been opened, opening the computer interface to be used must be selected in the update window (see Fig. 15). If the right interface is selected, the “Upload” button will be activated, allowing the update to be started with this button.

Firmware updates do not change any parameters already set (whereas the opposite is true of using the recessed “Factory setting” key, which restores settings to what they were on delivery of the device).

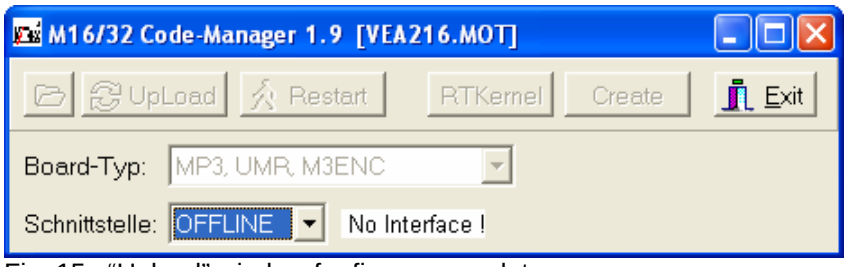


Fig. 15: “Upload” window for firmware update

If a firmware update is not successfully completed or fails to start because of a mistake, there is a way of forcing the component to take over new firmware. The necessary operational state is activated by switching the device off and then on again, with the “Factory Set” button pressed. The device will then starts a bootstrap routine to adopt the new firmware and then it will be possible to carry on with all the steps mentioned above.

3.4.5 Factory settings

To (re)set the factory settings (i.e. restore the device to the state it was delivered in), these are the options:

3.4.5.1 Setting by using the accompanying operator software

This will only be possible if the IP configuration for the device is known, including network address subnet mask, and the device can be contacted via the Ethernet interface.
The Internet browser should be used as described in Section 3.3.1 (“Connecting the network to the computer”) to access the device operation system. When the access data have been entered, the configuration menu will appear. The first line of the menu is the “Factory Setting” box.

If this box is clicked, all the parameters for the device which are capable of configuration, including the IP address, will be reset to those for the state the device was delivered in, and the device will be restarted. If the IP address used previously for the device was not the same as in the factory settings, the restart will mean that the software is no longer connected to the device.
To remedy this, the steps in Section 3.3.1 (“Connecting the network to the computer”) must be taken, using the reset IP address.

3.4.5.2 Setting by using the “Factory Set” key

To set all the parameters which are capable of configuration (including the IP address for the device) back to the factory settings, the recessed key “Factory Set” on the rear of the device must be pressed in for at least 5 seconds, until all the LEDs on the front are flashing at the same time, which confirms that reset has taken place. When the key is released, a new start will follow automatically in which the parameters are as reset.

3.4.5.3 Setting by using the maintenance software

The maintenance software is a Windows PC program module obtainable from BLANKOM which will create the factory settings.
The program is used for devices which do not have the “Factory Set” key on the rear or devices without the necessary support for this function.

Firstly, the maintenance software has to be installed on the operator PC and an RS232 connection must be established between this and the VEA 107 or VEA 108. The cable must be a null-modem cable. When the program has been started and the various procedures run, the VEA 107 or VEA 108 is restarted with all parameters reset.
Whichever procedure is used, the IP address of the VEA will be 192.168.2.86 and the netmask address 255.255.255.0 after the restart.

3.4.6 Integration into the headend management system for B- or C-LINE

If a VEA 107 or VEA 108 is being used in association with B- or C-LINE headend components, the possibility exists (from HCB 100 „BLUE“, item number 9650.03, upwards) of integrating the encoder into the overview of the headend and calling it up from this screen. A hub will be necessary in this case, through which the Ethernet connections of the HCB 100 and the VEA 107/108 are networked. Before this happens, in the configuration menu of the HCB 100 must be entered also the “lowest” of the IP addresses of all the VEA 107/108 encoders.

Notes:
It is only possible to enter (or change) IP addresses into the HCB 100 directly. This cannot be done from the HCB 100 HTML user interface.

If multiple VEA107/108 encoders are being integrated, it is important to note that the HCB100 will search in the network for any added IP address (N) with the “lowest” value and will then search for nine more with ever “higher” addresses (N+1...N+9). In consequence, the maximum number of VEA 107/108 encoders which can be included in the headend overview of an HCB100 is ten.
Switching on or resetting the HCB100 will cause any VEA 107/108 encoders in the network to be read and shown in the overview along with the rest of the system (see Fig. 16). By clicking “Edit”, a link is made to the IP address of the VEA 107 or 108 encoder and the login window opens. Once the “serial number” and the “password” have been entered, the encoder can be further configured as described in Section 3.3.

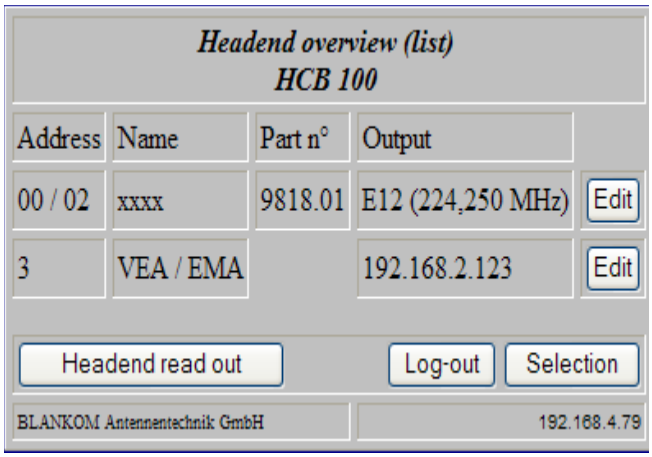


Fig. 16: HCB 100 user interface: headend overview

3.5 Options, updates/upgrades

There are hardware and software modules available which can extend performance or add functions to the VEA 107 and 108 system (see also Section 4.2).

3.5.1 RDS data transfer

The RDS option on the devices is to enable the RDS data for radio programmes to be converted and shown. The data arrives via the three RS232 serial interfaces on the rear of the device.
The hardware installed instead of the teletext processor will be automatically recognised. The necessary boxes will be placed in the configuration menu.
A shared baud rate will be established for the means of communication (using UECP) in the “system parameters” section of the menu via the RS232 interfaces. The rest of the settings are made in the relevant channel configuration.

There are two procedures available for the embedding and transmission of the RDS data.

Ancillary Data - the RDS data are packed and transmitted within the audio transport packets

Piped Mode - the RDS data are packed in separate transport packets and transmitted with their own PID.

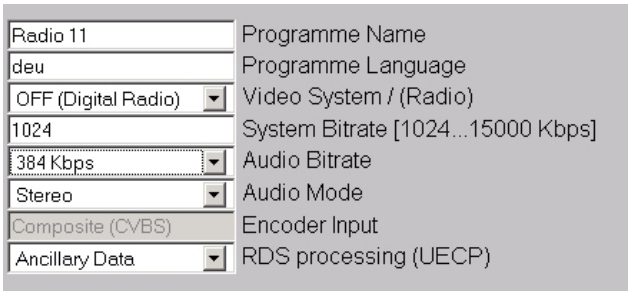


Fig. 17: Encoder menu for “Radio + Option RDS”

Notes:
If the RDS hardware has been installed, the TTX processing and VPS-WSS functions are not available when video signals are being input.

If the intention is solely to digitalise audio data and transmit them, the box for "Off (Digital Radio)" should be clicked for the “Video system” menu item. Then it will be possible to set the minimum value of 1024 kpbs for the system bitrate.

3.5.2 SDI signal interface

If the intention is to process incoming SDI signals, the FBAS/MPEG encoder components of the input channels can be replaced by SDI components. Mixed configuration is also possible.
For each channel, the operator boxes in the configuration menu will be shown in the form relevant to the hardware being used (see Fig. 18).

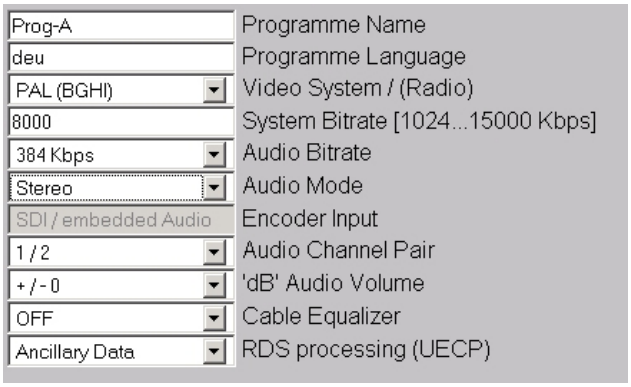


Fig. 18: Encoder menu for “SDI” option

The incoming SDI signal (uncompressed digital video with “embedded” audio signal) will arrive at the relevant BNC socket.

Special features of audio signal processing.

Within an SDI video signal it is possible to embed and transmit more than one sound channel with differing signals. The VEA 107 or VEA 108 can select any pair of signals from these and embed them in the DVB Transport Stream. The section of the configuration menu involved is “Audio Channel Pair”. There are the following additional configuration options available for the processing of the audio signals:

'dB' Audio Volume adapts the audio level (+/- 6 dB)

Audio Channel Pair selects one stereo pair from the multiple possibilities

Note:
If the SDI option is used for an encoder channel, its DIN audio socket will be disabled, which means that there will be neither an incoming analogue nor a digital signal accepted there.

3.5.3 Signal encoding

The VEA 108 hardware version permits programme encryption. Access to these programmes is then only possible with particular receivers, for which the broadcaster also has to distribute the rights. Within the system there are some very basic administration tools included. Provision is made for software interfaces by which complex administration systems can be added on.

3.5.4 Data transmission (customised)

The VEA 107 and VEA 108 encoders are delivered ready for transmission of data in DVB Transport Streams (Data PID enabled).
If required, a customised project will be implemented for this function and supplied in the form of an update. which is chargeable. The price will be calculated according to the work involved.

4. Appendix

4.1 Technical data

General Data	
Casing, dimensions for installation	19" Rack 1 U / 44 x 440 x 281 mm (H x W x D)
Operating voltage	85 – 264V ~ / 50/60Hz 110 – 370V =
Power taken up	15 VA
Weight	4.4 kg
DVB features	
Video Encoder	
Standards	PAL (B/G, H, I, N) NTSC (M)
Compression	MPEG-2 (MP@ML)
Format	720 x 576 pixels
System bitrate	1024 ... 15,000 kbps (depending on no. of channels)
Audio Encoder	
Compression	MPEG-1 Layer 1/2
Sampling frequency	48 kHz, stereo
Bitrate	64 ... 384 kbps
Transport Stream output port	
Protocol	ASI, continuous Mode, 188 byte
Plug connection	1x BNC / 75 Ohm
Bitrate	13.5 – 43.2 Mbps (12 discrete rates)
Channels in the TS max. 15 (by combining devices)	1 – 3 (single device)
Transport Stream input port	ASI, only for the TS from the VEA 107/108 (cascade system) 1x BNC / 75 Ohm
A/V input ports **(FBAS or analogue audio)**	
Video IN	3 x BNC / 1 V_{ss} / 75 Ohm
Audio IN	3 x 8-pole sockets as per EN 60130-9 (IEC-130-9-20 or DIN 45326 as approp.) 6 dBm at 600 ohms, symmetrical
SDI hardware option	
Video / Audio IN	3 x BNC / 800 mV_{ss} / 75 Ohm / 270 Mbps
Video standard	SMPTE 259M-C
Audio standard	AES/EBU (48 kHz sampling frequency, embedded)
RDS hardware option	
RDS data input ports	3 x RS 232 interfaces (sub D, 9 poles, m / DTE) (1 per channel)
Transmission method	Ancillary Data or Piped Mode
Remote control	Ethernet IP interface; UDP / IP (for settings and/or data)

Extension

Cascade system
(To form a DVB Transport Stream with max. 15 channels and 1 data channel, 5 VEA 107/108 can be cascaded via the ASI.)

Extra functions

Teletext, VPS, WSS
(Transparent transmission of teletext signals,
conversion and onward transmission of VPS und WSS signals)

(The right is reserved to make changes to reflect technical progress.)

4.2 Versions, options

The VEA 107/108 series can be supplied in a variety of configurations according to the optional features (see also Section 3.5).
The following table provides a summary:

Type	Item No.	Input ports A	Input ports B	Input ports C	Notes
VEA 107	9170.81	A/V	A/V	A/V	Basic variant
VEA 107	9170.85	SDI	SDI	SDI	Basic variant
VEA 107	9170.83	A/V + RDS	A/V + RDS	A/V + RDS	Basic variant
VEA 108	9171.81	A/V	A/V	A/V	Basic variant
VEA 107	9170.75	SDI	A/V	A/V	Option
VEA 107	9170.76	SDI	SDI	A/V	Option
VEA 107	9170.91	SDI or A/V	SDI or A/V	SDI or A/V	Modules with only 1 or 2 Inputs available upon request, customized
VEA 107	9170.93	A/V + RDS	A/V + RDS	A/V + RDS	Accessories customized
VEA 108	9171.91	A/V	A/V	A/V	Accessories customized

Table 7: Versions and options for VEA 107 and VEA 108

Abbreviations explained (Table 7):

A/V	Input ports for analogue audio and video signals
SDI:	Input ports for digital audio and video signals (audio embedded)
A/(V) + RDS:	Input ports for analogue audio signals, plus additional (sub D) sockets for Radio Data System signals to create MPEG radio programmes (in this case, there is no need for a video feed)

4.3 Block diagrams

4.3.1 Basic VEA 107/108 version (analogue A/V + VBI processor)

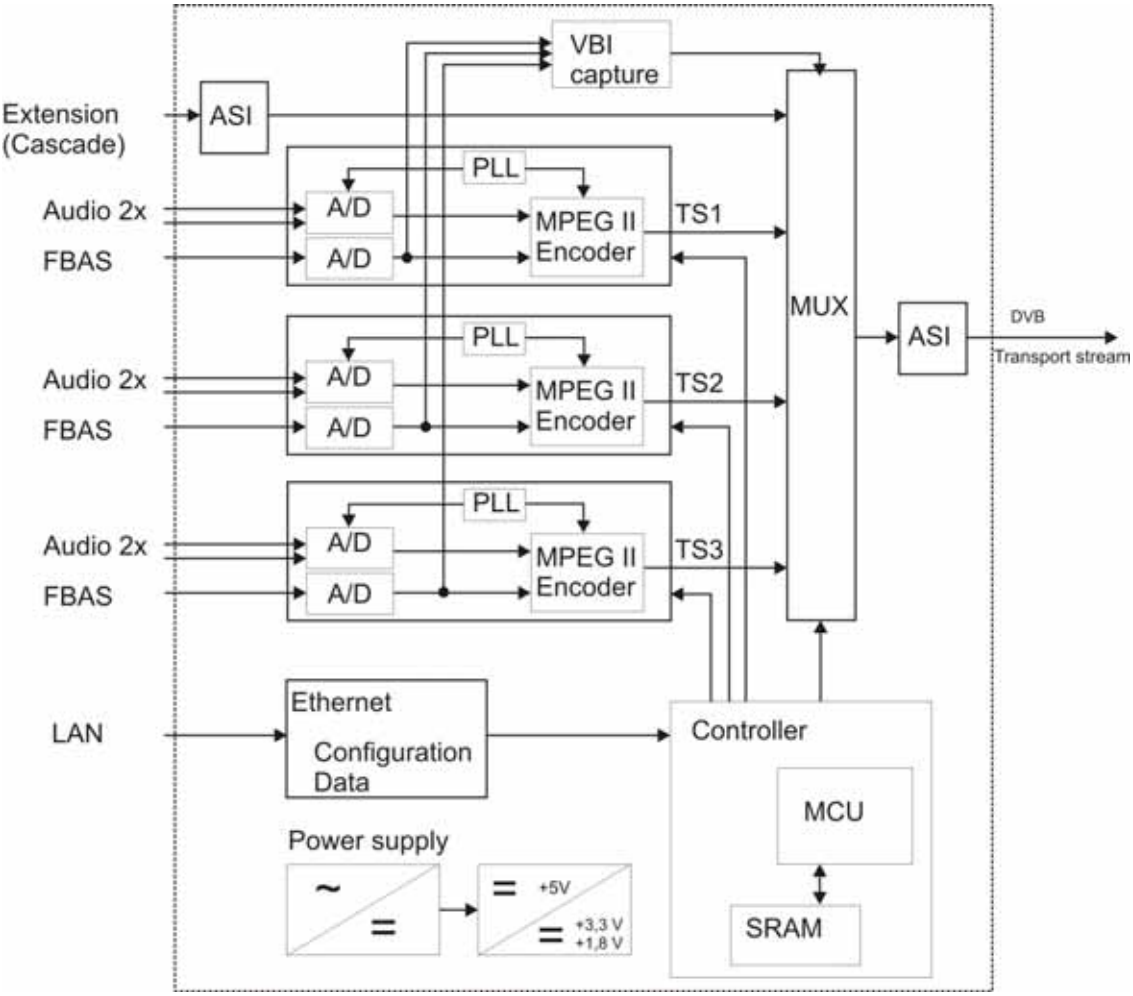


Fig. 19: Block diagram for VEA 107/108 (analogue A/V)

4.3.2 Optional versions, VEA 107 and VEA 108

Alternative 1: RDS processor fitted instead of VBI processor

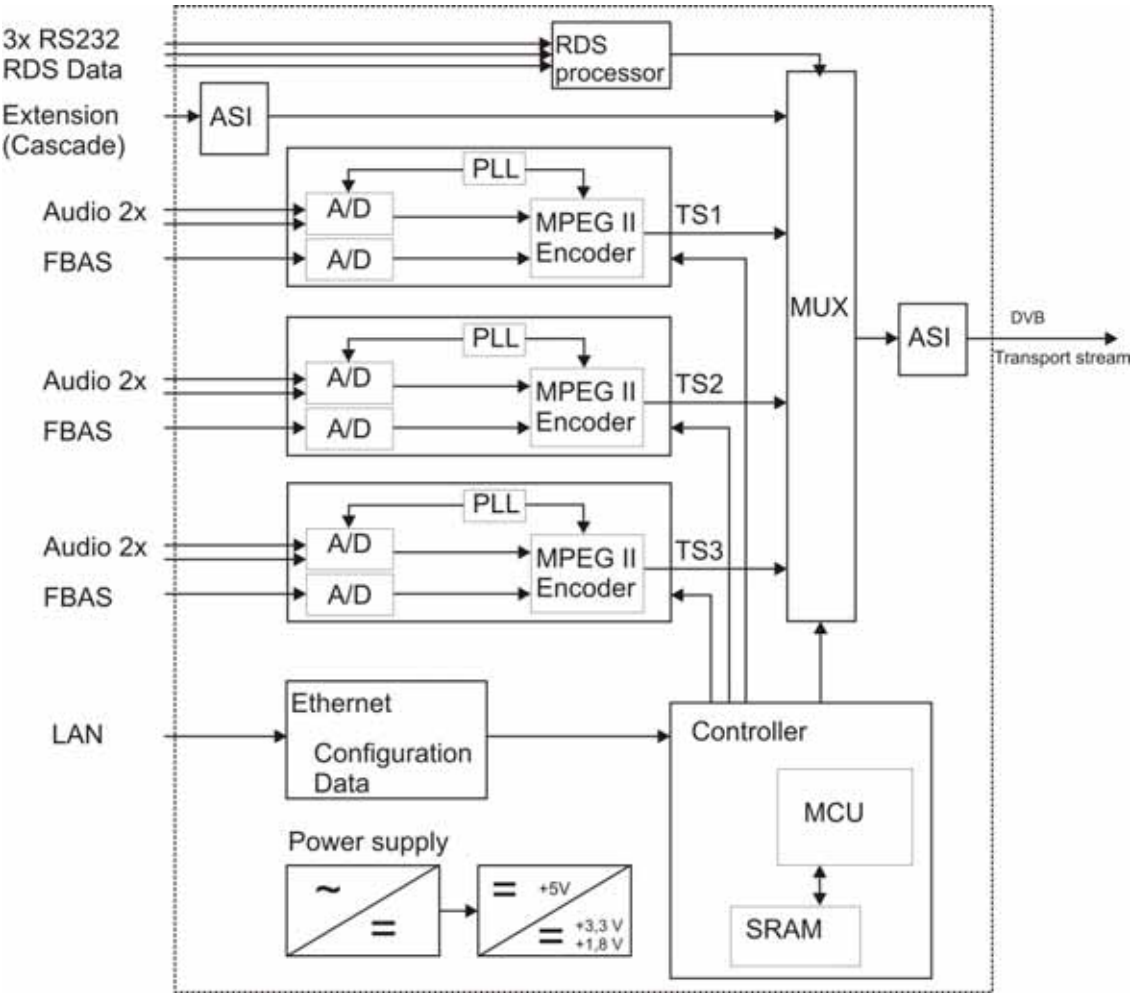


Fig. 20: Block diagram for VEA 107 and VEA 108 (RDS option)

Alternative 2: SDI input ports fitted instead of analogue A/V input ports

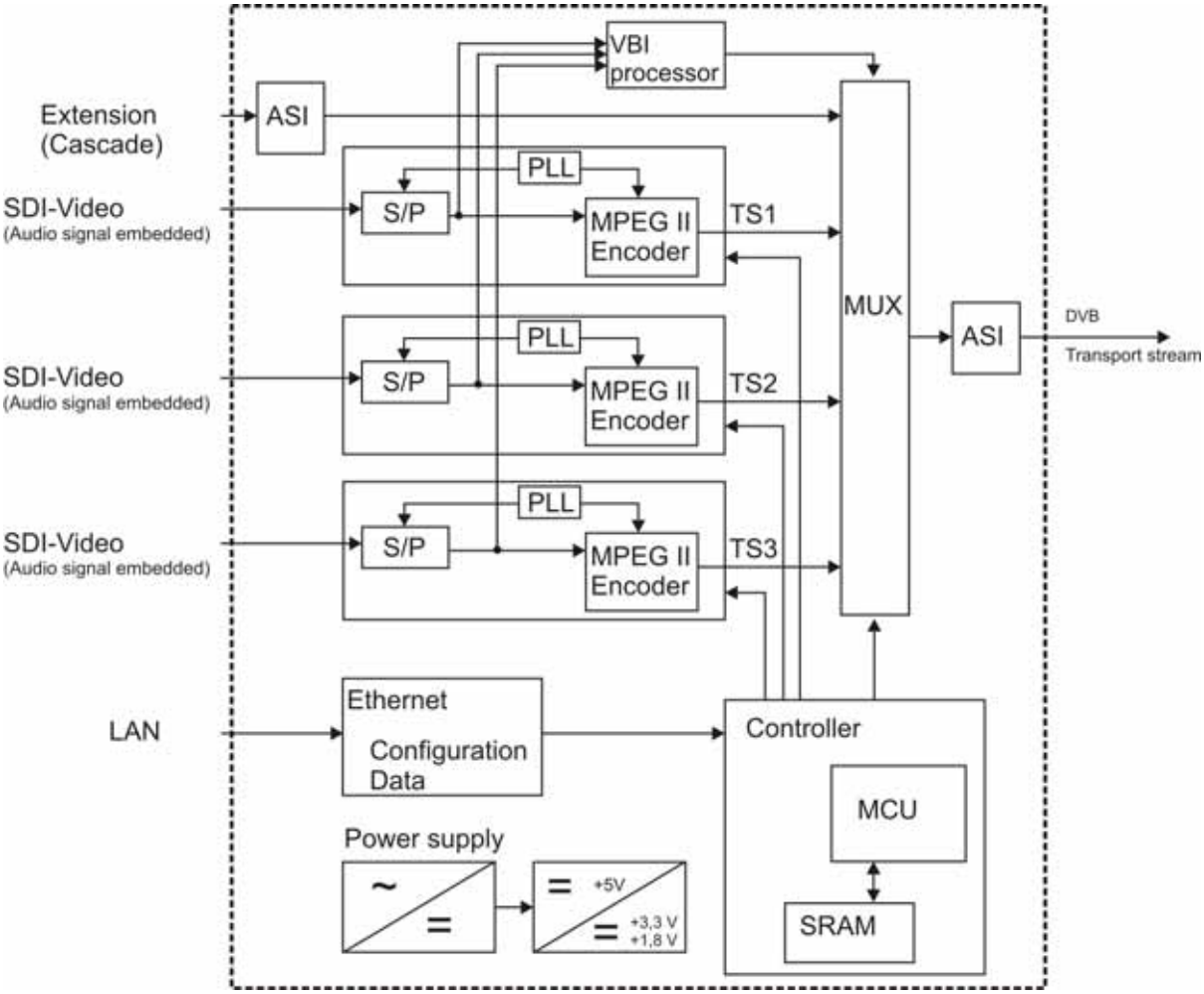


Fig. 21: Block diagram for VEA 107 and VEA 108 (SDI option)

4.4 Accessories

4.4.1 Accessories as standard

The following items are included in the standard scope of delivery:

1 x Power cord/cable
1 x 19" installation set (4 bolts; 4 washers; 4 cage nuts)
2 x replacement fuses 1A / 250V
1 x null modem cable; 3 m; 9 poles (2 sub D sockets)
1 x patch cable; cross-linked; 3 m; 8 poles (2 RJ45 plugs)
1 x BNC connecting cable; 0.34 m
3 x 5poles/pins plugs
1 x manual (including Certificate of Guarantee)
3 x 5-digit serial number (supplied in the manual, in a storage case)

4.4.2 Optional accessories

The optional accessories (see Table 8 and 9) can be ordered individually as required.

4.4.2.1 Cables

Purpose	Plug connection	Length	Type	Item no.
Video connector cable	BNC-BNC	0.34 m	VVK 526	8025.26
	BNC-BNC	1 m	VVK 540	8025.40
	BNC-BNC	2 m	VVK 541	8025.41
	BNC-BNC	3 m	VVK 542	8025.42
	BNC-BNC	... m*	VVK 543	8025.43
Video adapter cable	BNC-Cinch	1 m	VAK 537	8025.37
	BNC-Cinch	2 m	VAK 538	8025.38
	BNC-Cinch	3 m	VAK 539	8025.39
	BNC-Cinch	... m*	VAK 560	8025.60
Audio connector and control cable	DIN 8p. – DIN 8p.	1 m	ASK 545	8025.45
	DIN 8p. – DIN 8p.	2 m	ASK 546	8025.46
	DIN 8p. – DIN 8p.	3 m	ASK 547	8025.47
	DIN 8p. – DIN 8p.	... m*	ASK 548	8025.48
Audio adapter cable	DIN 5p. -2 x XLR sockets	0.2 m	AAK 536	8025.36
	DIN 5p. -2 x Cinch	1 m	AAK 564	8025.64
	DIN 5p. -2 x Cinch	2 m	AAK 535	8025.35
	DIN 5p. -2 x Cinch	3 m	AAK 566	8025.66
	DIN 5p. -2 x Cinch	... m*	AAK 567	8025.67
Cable to connect device to mains	C13 (standard connector cable)-CEE7/7 (Schuko-type angle plug)	2 m	NKW 200	0144

Table 8: Optional cables (length as required by customer designated m*)

4.4.2.2 Plug-in connectors

Purpose	Plug connection	Cable diameter	Type	Item no.
Audio plugs	DIN plug connector, 8 poles	6 mm	SV 081	0141
	DIN plug connector, 5 poles	6 mm	SV 050	0143

Table 9: Optional plug-in connectors

(Further accessories are to be found in the BLANKOM Antennentechnik main catalogue)

4.5 Glossary and abbreviations

Term	Meaning	Notes
ASI	Asynchronous Serial Interface	Interface to transmit DVB Transport Stream BNC connection, 75 ohms
Audio bit rate	Digital bandwidth for audio transmission one element of the system bit rate	The higher the value the better the transmission quality, but it may (slightly) limit the video bit rate.
Audio mode	Options for the audio channels to be transmitted: stereo, joint stereo, dual channel, mono, Use VPS	The relevant option is entered fixed into the VEA 107 or VEA 108 coding. It will be transmitted with the additional DVB information.
DHCP	Dynamic Host Configuration Protocol: enables networked devices to receive IP addresses automatically	If there is no DHCP service available or DHCP is switched off, the IP address which has been set will be used
Input channels	Audio or video signal input	Analogue (video and audio separately) SDI (video and audio embedded)
IP address	Network address for access to data and configuration (in case there is no DHCP service)	Factory setting: 192.168.2.86
IP subnet mask	Mask for detailed identification of the address in the network	Factory setting: 255.255.255.0
Load parm	Reads back the parameter settings for the VEA 107 and VEA 108 and shows them in the settings masks	The parameters can be viewed and altered. The altered parameters are written back using “Save parm”
Master	Individual device or 1st device of cascaded set of VEA 107 or VEA 108	Serves as basis for the Transport Stream
MIB	Management Information Base	The device-specific file (ME.mib) to serve the system via SNMP

Term	Meaning	Notes
Network ID	This ID gives the unique identification for the link between DVB Transport Streams (TSs) and a particular (cable) network Within the network this ID is the same for all TSs	An element of the NIT; is usually overwritten by the succeeding modulator component
NIT	Network Information Table; this is an important table for the transmission of channel parameters. The NIT supports, for example, the "seek" function in the DVB receivers so that a broadcaster is found	The VEA 107 or VEA 108 is capable of setting up this table. It can be added to or overwritten by the succeeding modulator.
Password	Access to configuration via the IP network is password-protected	When the device is supplied, the password is "**neu**" (the German word for "new")
Programme language	For the programme language, use the language abbreviations in ISO 693	The details will be displayed in the receiver for the information of the user.
Programme name	Name of the newly created DVB programme; one name for each AV channel	The name of the programme will be presented for selection in the table of broadcasters by the DVB receiver.
RDS	Radio Data System	Additional digital information on analogue radio programmes, such as name of broadcaster, brief details, special announcements etc.
Save parm	This writes the configuration details back to the VEA 107 or VEA 108 once set	These parameters are read using "Load parm"
SDI	Serial Digital Interface for digital, uncompressed video signals	270 MBit/s, transmission via BNC cables, audio data can be embedded
SDT	Service Description Table	This contains the programmes offered and relevant details of broadcaster
Serial number	Unique 5-digit serial number of device	This serial number is on the rear of the device
Slave 1 ... Slave 4	Slave VEA 107 or VEA 108 devices which are part of the cascade system producing a shared Transport Stream following on from the Master	**Warning.** The parameters to be set at the device are not the same for each in a multi-device system. Maximum configuration: 1x Master, 4x Slaves = 15 programmes (+ 1x data)
SNMP	Simple Network Management Protocol	A simple interface protocol allowing data exchange and device control via the network
System bitrate	The digital bandwidth available for an A/V channel.	System-bitrate = TS-out bitrate / A/V channels + 1 (The audio bitrate employed is an element of the system bitrate)
TS	Transport Stream (a data signal in packets)	The whole of the information necessary to enable transmission of digital signals. One Transport Stream can contain more than one programme, with audio, video, teletext and details.

Term	Meaning	Notes
TS-ID	Transport Stream identification (unique designation of the Transport Stream)	When VEA 107 or VEA 108 devices are linked up in series for a shared Transport Stream, they must all use the same TS-ID.
TS out bitrate	Output data bitrate of the Transport Stream = digital bandwidth	The TS-out bitrate can be set in 12 separate stages between 43.2 Mbps and 13.5 Mbps. All VEA 107 or VEA 108 devices in a multiple system must use the same bitrate.
TTX processing	Teletext processing and onward transmission (analogue -> digital)	Teletext contained in the analogue signal will be converted into packets for digital transport and transmitted in the DVB signal
Video format Video system	Standards applying to the analogue video input signals which require conversion	Factory setting: PAL. Alternatively NTSC may be selected
VPS / WSS	VPS signal for recording control in video recorder WSS format control for the TV itself	Both these signal components are contained in the analogue TV signal. If the settings have WSS = ON and VPS = ON, these components of the signal will be converted and transmitted in the DVB signal.